

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-42 (Cancelled).

Claim 43 (New): A device for measuring electrical activity of at least one biological element, comprising:

a substantially plane substrate, which has a lower face and an upper face and which has at least one through opening for housing the biological element, said opening being delimited by a set of walls;

two substantially plane plates placed on either side of the lower and upper faces of the substrate and that delimit with the set of walls a chamber that is filled, when the device is being used, with a liquid medium;

wherein each of the plates is provided, on its face lying opposite the substrate, with at least one electrode facing the opening in the substrate;

wherein each of the plates further has at least one channel that starts inside the chamber and connects the chamber to outside of the device; and

wherein the chamber communicates with the outside of the device only through the channels.

Claim 44 (New): A device according to claim 43, wherein the opening in the substrate comprises an upper part, a central part, and a lower part that are coaxial, the upper and central parts forming a cup for housing the biological element, whereas the lower part forms a reservoir for housing a volume of liquid medium sufficient to create therein, by suction, a vacuum suitable for forming a high-resistance seal between the element and the cup.

Claim 45 (New): A device according to claim 44, wherein the upper part of the opening in the substrate is of frustoconical shape, whereas the central part of the opening is of cylindrical shape.

Claim 46 (New): A device according to claim 45, wherein the upper part of the opening in the substrate has its largest diameter between 20 and 100 microns and its smallest diameter between 10 and 30 microns and has a height of between 10 and 50 microns, whereas the central part of the opening has a diameter of between 0.1 and 3 microns and a height of 100 microns or less.

Claim 47 (New): A device according to claim 45, wherein the upper part of the opening in the substrate has its largest diameter between 500 microns and 1.5 mm and its smallest diameter between 200 and 600 microns and has a height of between 300 microns and 10 mm, whereas the central part of the opening has a diameter of between 0.1 and 3 microns and a height of 100 microns or less.

Claim 48 (New): A device according to claim 44, wherein the lower part of the opening in the substrate is cylindrical and measures between 10 and 100 microns in diameter for a height of 300 to 700 microns.

Claim 49 (New): A device according to claim 43, wherein the substrate comprises one or more micromachinable materials.

Claim 50 (New): A device according to claim 44, wherein the substrate comprises silicon.

Claim 51 (New): A device according to claim 43, wherein the substrate is formed from two silicon wafers that are placed on either side of an intermediate membrane to which the two silicon wafers are fastened.

Claim 52 (New): A device according to claim 51, wherein the intermediate membrane comprises an insulating material or a silicon wafer coated on its various faces by an insulating material.

Claim 53 (New): A device according to claim 52, wherein the insulating material comprises silicon dioxide or silicon nitride.

Claim 54 (New): A device according to claim 51, wherein the upper part of the opening in the substrate is delimited by the wall of a through recess made in one of the silicon wafers that are placed on either side of the intermediate membrane, whereas the lower part of the opening of the substrate is delimited by the wall of a through recess made in the other of the silicon wafers.

Claim 55 (New): A device according to claim 51, wherein the central part of the opening in the substrate is delimited by the wall of a through recess made in the intermediate membrane.

Claim 56 (New): A device according to claim 51, wherein the central part of the opening in the substrate is delimited by a first cylindrical wall corresponding to the wall of a through recess made in the intermediate membrane and by a second cylindrical wall protruding from the first cylindrical wall towards the upper face of the substrate.

Claim 57 (New): A device according to claim 44, wherein the upper face of the substrate is covered with a film made of a biocompatible material and is provided with at least one through opening, the opening being coaxial with the upper part of the opening in the substrate, with a same geometry but with a larger cross section.

Claim 58 (New): A device according to claim 57, wherein the opening in the film is frustoconical and has its largest diameter between 500 microns and 1.5 mm and its smallest diameter between 200 and 600 microns and has a height of between 300 microns and 1 mm.

Claim 59 (New): A device according to claim 43, wherein the plates lying on either side of the lower and upper faces of the substrate comprise an insulating material and the electrodes carried by the plates are plane electrodes, especially Ag/AgCl⁻ contacts.

Claim 60 (New): A device according to claim 43, wherein the plate lying opposite the upper face of the substrate has two channels.

Claim 61 (New): A device according to claim 43, wherein the plate lying opposite the lower face of the substrate has only one channel.

Claim 62 (New): A device according to claim 60, wherein the two channels of the plate lying opposite the upper face of the substrate pass through the thickness of the plate.

Claim 63 (New): A device according to claim 43, wherein the one channel of the plate lying opposite the lower face of the substrate passes through the thickness of the plate.

Claim 64 (New): A device according to claim 60, wherein the two channels of the plate lying opposite the upper face of the substrate circulate within the thickness of the plate, substantially parallel to the faces of the plate, until reaching one of edges of the plate.

Claim 65 (New): A device according to claim 61, wherein the one channel of the plate lying opposite the lower face of the substrate circulates within the thickness of the plate, substantially parallel to the faces of the plate, until reaching one of edges of the plate.

Claim 66 (New): A device according to claim 43, wherein the opening in the substrate, the electrodes carried by the plates lying on either side of the lower and upper faces of the substrate, and the channel of the plate lying opposite the lower face of the substrate are coaxial.

Claim 67 (New): A device according to claim 43, further comprising means for sealing the chamber and for damping electrical noise and vibrations emanating from a surrounding medium.

Claim 68 (New): A device according to claim 67, wherein the means for sealing the chamber and for damping the electrical noise and the vibrations emanating from the

surrounding medium comprises a first gasket inserted between the substrate and the plate lying opposite the lower face of the substrate, and a second gasket inserted between the substrate and the plate lying opposite the upper face of the substrate, each of the first and second gaskets being provided with at least one perforation arranged and dimensioned to circumscribe the electrode on the plate with which it is in contact.

Claim 69 (New): A device according to claim 67, wherein the substrate, the plates lying on either side of the lower and upper faces of this substrate, and the means for sealing the chamber and damping the electrical noise and the vibrations emanating from the surrounding medium are modules that are assembled in a removable manner.

Claim 70 (New): A device according to claim 69, further comprising means for holding the substrate, the plates that lie on either side of the lower and upper faces of the substrate, and the means for sealing the chamber and damping electrical noise and vibrations emanating from a surrounding medium, in place in an assembled condition.

Claim 71 (New): A device according to claim 43, configured for measuring electrical activity of plural biological elements in parallel;

wherein the substrate comprises a plurality of identical through openings uniformly spaced apart;

wherein the plates lying on either side of the lower and upper faces of the substrate are printed circuits that are each provided with as many electrodes as the substrate has through openings;

wherein the plate lying opposite the lower face of the substrate has at least as many channels as the substrate has through openings; and

wherein the plate lying opposite the upper face of the substrate has at least as many channels for introducing substances and at least as many channels for removing substances as the substrate has through openings.

Claim 72 (New): A device according to claim 71, comprising two identical gaskets each provided with as many perforations as the substrate has through openings.

Claim 73 (New): A device according to claim 72, comprising two identical clamps that fit over edges of a stack formed by the substrate, the plates lying on either side of the lower and upper faces of the substrate, and the gaskets.

Claim 74 (New): Application of a device as defined in claim 43 for screening molecules for therapeutic purposes.

Claim 75 (New): Application of a device as defined in claim 43 for diagnosing pathologies associated with an ion channel dysfunction.

Claim 76 (New): Application of a device as defined in claim 43 for detecting toxic substances.

Claim 77 (New): Application of a device as defined in claim 43 for detecting living cells or cells having their membrane integrity preserved.

Claim 78 (New): Application of a device as defined in claim 43 for detecting dead cells or cells having lost their membrane integrity.

Claim 79 (New): Application of a device as defined in claim 43 for detecting release of substances from cells by exocytosis.

Claim 80 (New): Application of a device as defined in claim 43 for measuring a variation of membrane capacitance resulting from fusion of a cell with another cell or with a vesicle.

Claim 81 (New): Application of a device as defined in claim 43 for stimulating cells.

Claim 82 (New): Application of a device as defined in claim 43 for studying intracellular activity of a cellular network, or of a tissue, or of a cellular co-culture.

Claim 83 (New): Application of a device as defined in claim 43 for studying response of first cells to an electrical stimulation applied to second cells.

Claim 84 (New): Application of a device as defined in claim 43 for studying mechanical-sensitive ion channels with a view to providing mechanical sensors.